

Nov. 9, 1937.

F. W. TREPTOW

2,098,321

DISTRIBUTING FRAME

Filed June 7, 1935

4 Sheets-Sheet 1

FIG. 1

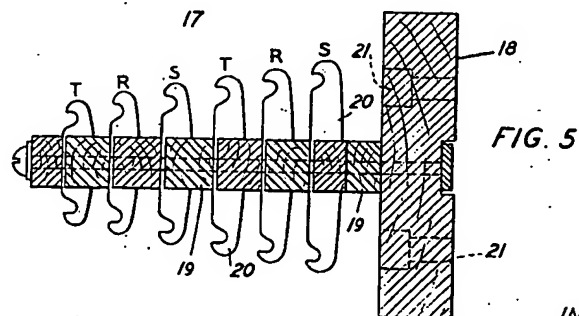
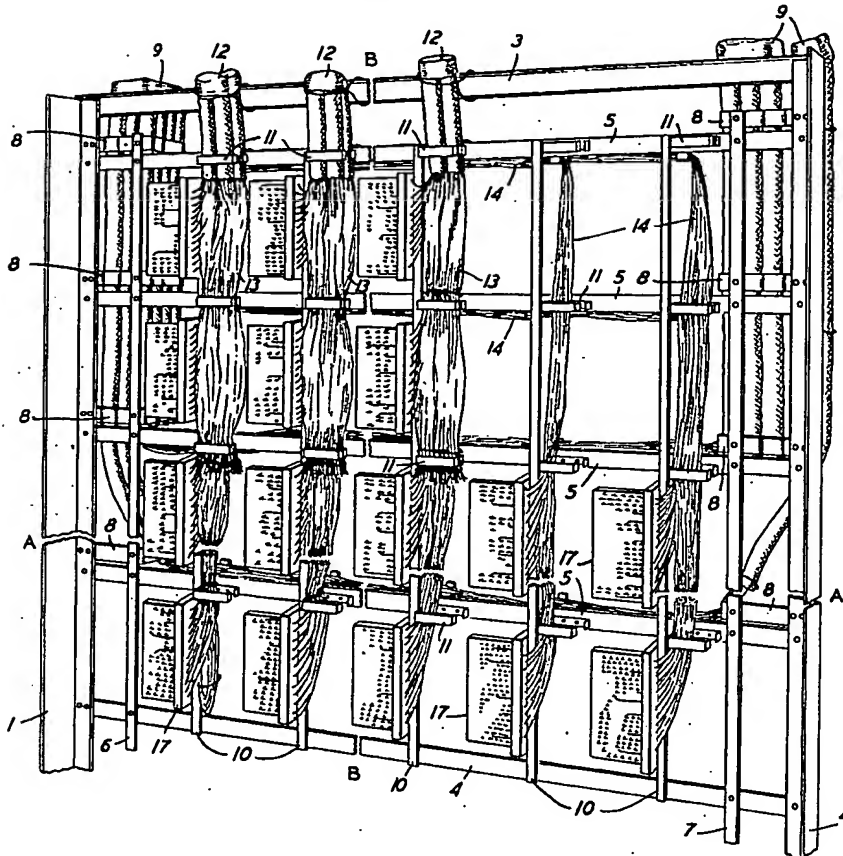


FIG. 5

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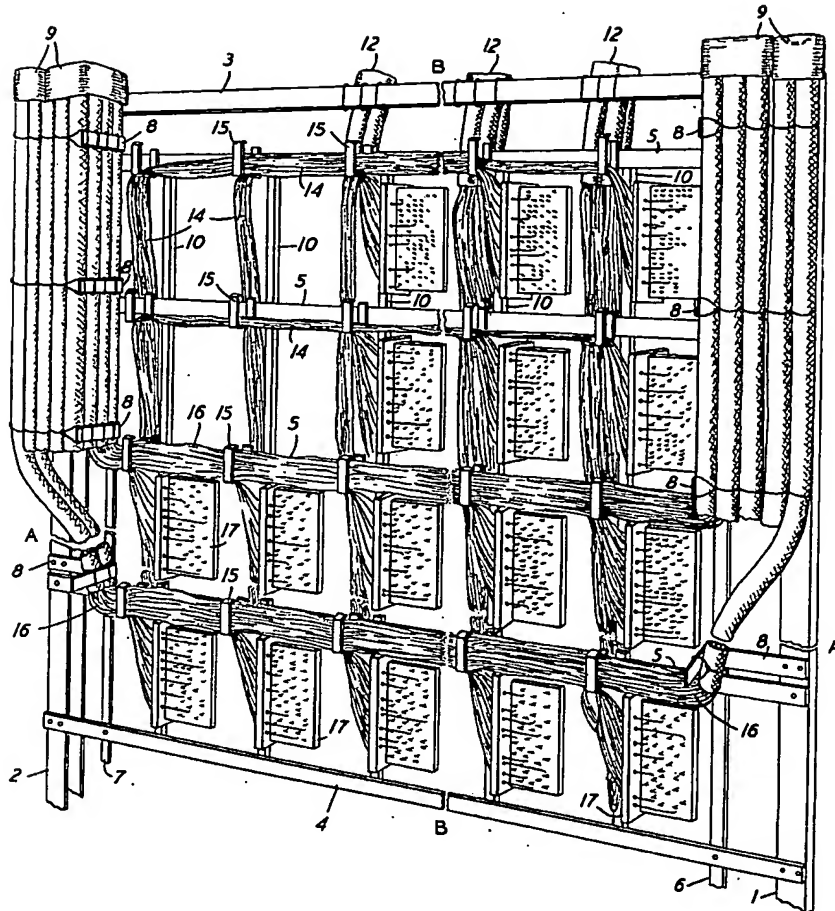
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4 Sheets-Sheet 2

FIG. 2



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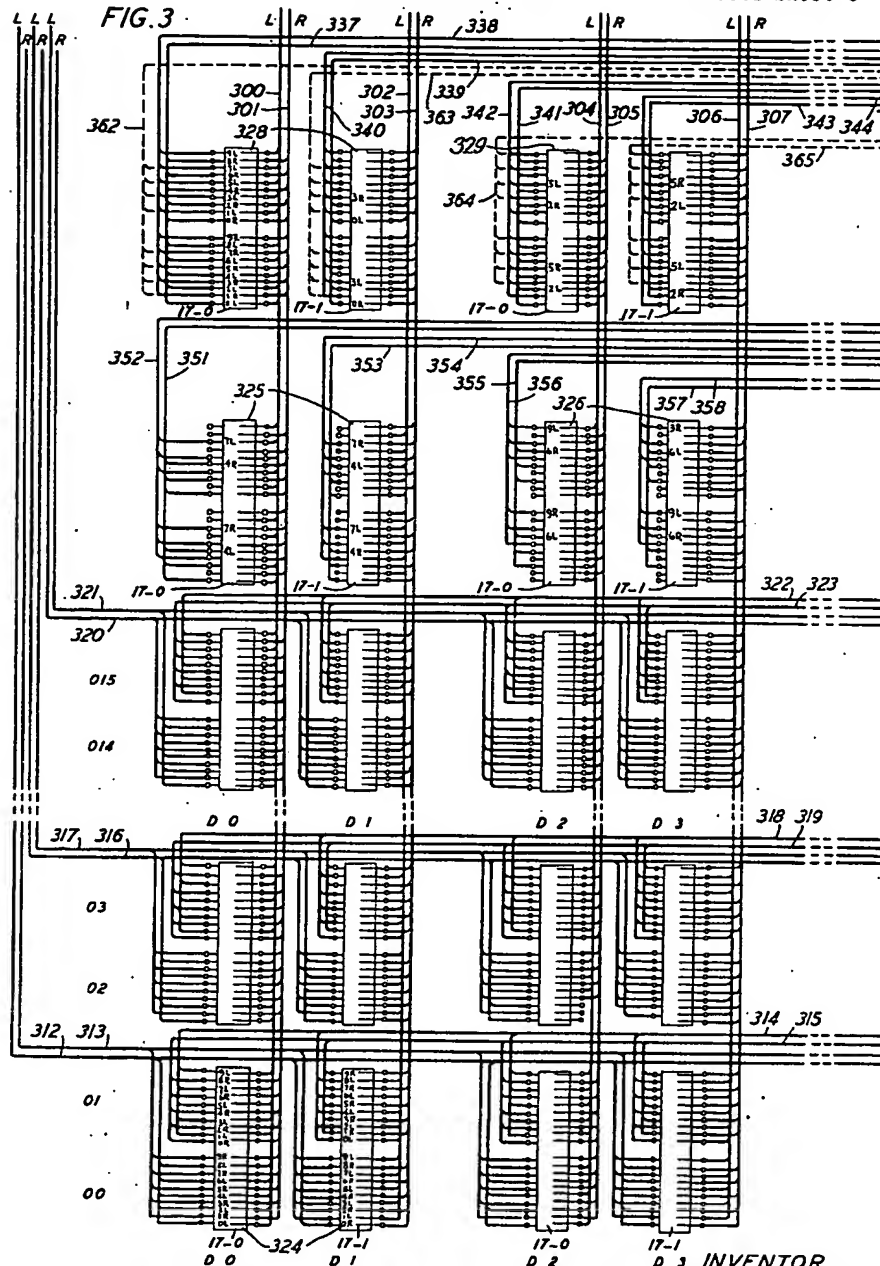
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4 Sheets-Sheet 3



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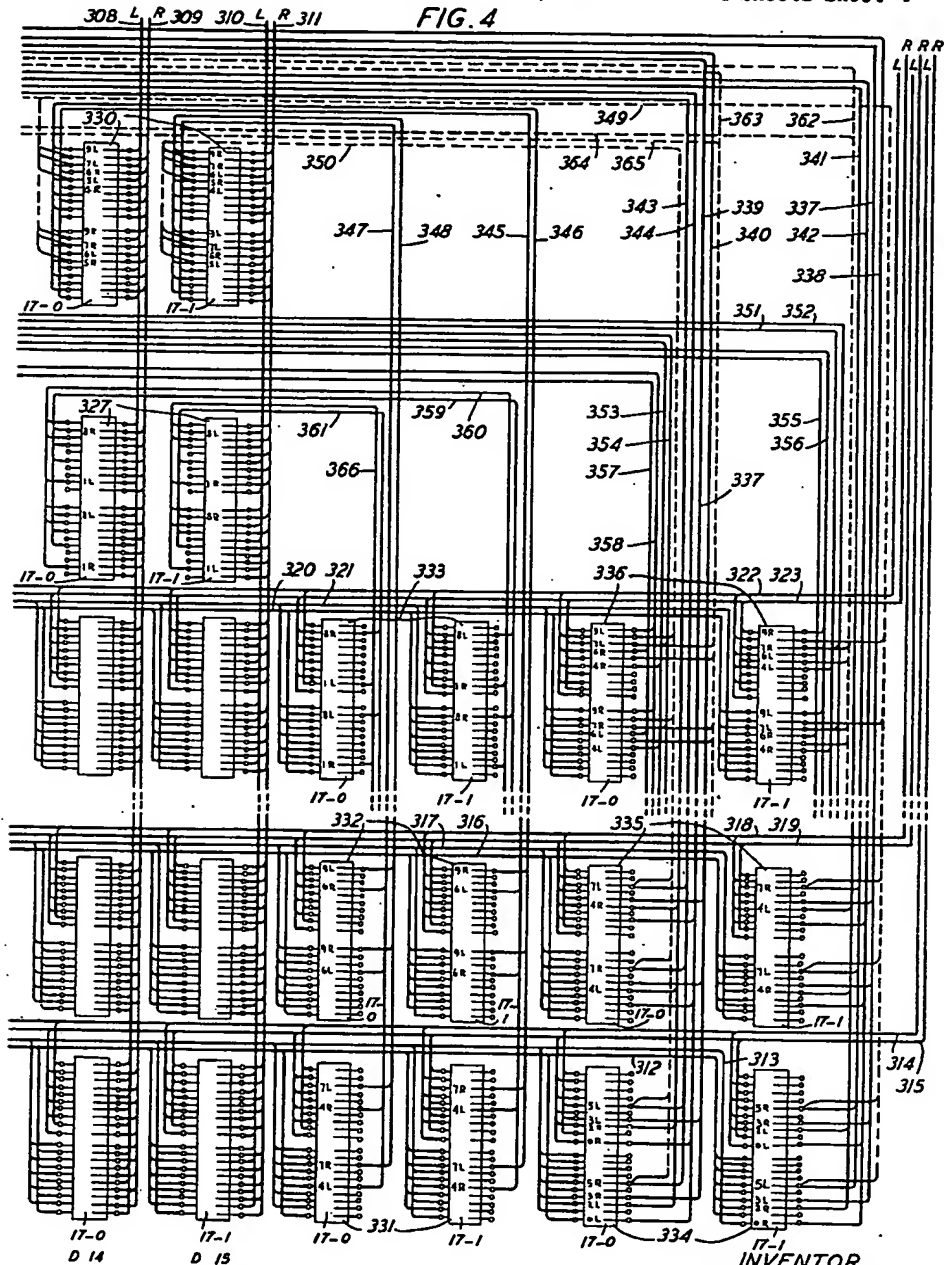
2,098,321

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4 Sheets-Sheet 4

FIG. 4



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## UNITED STATES PATENT OFFICE

2,098,321

## DISTRIBUTING FRAME

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Application June 7, 1935, Serial No. 25,397

10 Claims. (Cl. 179—98)

This invention relates to a distributing frame and system of trunk distribution between the frames of switches of one switching stage and the frames of switches of a succeeding switching stage of a dial switching telephone system. The invention is particularly applicable to the distribution of trunks between successive switching stages of telephone systems of the cross-bar type.

In the cross-bar system the switches of the first switching stage of district switches are mounted on a plurality of separate frames called district link frames there being as many of these frames as are necessary to handle the expected traffic. When an office reaches its ultimate capacity twenty, for example, of such frames of district link switches might be installed and completely equipped. Similarly, the switches of the second switching stage or office switches are mounted on a plurality of separate frames called office link frames of which there would be a number equal to the number of district frames. Reference may be had to the application of W. W. Carpenter, Serial No. 27,305, filed June 19, 1935, for a disclosure of a cross-bar system.

To enable connections to be established in accordance with the trunking procedure inherent to the cross-bar system, it is necessary for each district link frame to have trunking access to every office link frame. For example, each district link frame is equipped with ten secondary district link switches each divided into a right and left section, each section having access to ten trunks extending toward the office link frames. Also each office link frame is equipped with ten primary office link switches each similarly divided into a right and left section to which trunks from the district link switches are incoming. It is thus apparent that there is a group of two hundred trunks outgoing from the ten secondary district switches of each district link frame which must be distributed to primary office switches on all equipped office link frames.

It is therefore the object of the present invention to provide a distributing frame and system of trunk distribution therethrough whereby the easy distribution of the trunks extending from each district link frame to all office link frames may be made in a simple and efficient manner.

In accordance with the present invention this object is accomplished by fanning the cables of trunks incoming from each district link frame and the cables of trunks outgoing to each office link frame over the terminals of coordinately arranged terminal strips mounted on a distributing frame positioned between the district link and office link

frames. The trunks from one district link frame or two hundred trunks are placed in cables, for example in two cables of one hundred trunks each and are fanned vertically from the top to the bottom of the frame over one vertical row of terminal strips. The cables from other district link frames are similarly fanned over other vertical rows of terminal strips. The trunks outgoing to each office link frame are similarly grouped into cables, for example two cables of one hundred trunks each and run horizontally across the opposite side of the frame and fanned over the horizontal rows of terminal strips so that direct connection between the incoming and outgoing trunks may be made through the terminal strips without the use of jumpers.

Each terminal strip may be of the type employed on main distributing frames and is provided with forty sets of terminal lugs, each set comprising tip, ring and sleeve terminals. The strip is mounted vertically on the frame so that its individual terminal lugs each extend from the front of the frame toward the rear of the frame. As thus positioned the forty terminals sets appear in two vertical rows of twenty sets each. Trunks incoming from one district link frame are connected to the front ends of the twenty terminal sets of one vertical row and trunks incoming from a second district link frame are connected to the front ends of the twenty terminal sets of the second vertical row. Trunks outgoing to one office link frame are connected to the rear ends of the upper ten terminal sets of both vertical rows and trunks outgoing to a second office link frame are connected to the rear ends of the lower ten terminal sets of both vertical rows.

Assuming that an office when installed to its ultimate capacity must be arranged for distributing two hundred trunks from each of twenty district link frames to twenty office link frames providing for the distribution of ten trunks from each district link to each office link without jumpers, the distributing frame is equipped with one hundred terminal strips arranged coordinately in ten vertical rows of ten strips each. For an office in which the ultimate number of district link and office link frames is less than eleven, in which twenty trunks from each district link to each office link may be distributed without jumpers, the distributing frame would require but fifty terminal strips arranged coordinately in five vertical rows of ten strips each.

When less than the ultimate capacity of a distributing frame is required initially, the cable pattern for the ultimate is employed and the dis-

trunk trunks which are then not connected to office trunks are jumpered in such a manner that an addition of district link and office link frames at a future date would merely require the addition of terminal strips, the removal of some or all of the jumpers and the addition of the cables required for the new frames. The jumpers are run from the rear ends of the terminal sets to which no office trunks are connected to the front ends of the terminal strips to which no district trunks are connected. The jumper connections on the distributing frame are not disturbed except upon the addition of district link and office link frames to the office and the cables when once installed are left undisturbed.

While in the foregoing description the method of trunk distribution has been applied between district link and office link frames, it is to be understood that it is equally applicable to trunk distribution between incoming and line link frames.

A clearer understanding of the invention may be had from a consideration of the following detailed description taken in connection with the accompanying drawings of which:

Fig. 1 is a front elevational view of a distributing frame showing trunks incoming from district link frames fanned vertically over the vertical rows of terminal strips;

Fig. 2 is a rear elevational view of the frame showing trunks outgoing to office link frames fanned horizontally over the horizontal rows of terminal strips;

Figs. 3 and 4 taken together, with Fig. 4 placed in the right of Fig. 3 show a typical wiring diagram of the frame disclosed in Figs. 1 and 2; and

Fig. 5 is a cross-section through one of the terminal strips of the frame.

The frame shown in Figs. 1 and 2 illustrates the application of the invention to the distribution of trunks incoming from sixteen fully equipped district link frames to trunks outgoing to sixteen fully equipped office link frames. The frame for actual installation would be arranged for ultimately distributing trunks incoming from twenty or more district link frames to trunks outgoing to the same number of office link frames and would therefore be constructed in two adjacent bays. For the purpose of simplifying the disclosure, however, the frame has been illustrated as a single bay and fore shortened both vertically and horizontally as indicated by the broken section lines at A—A and B—B.

The frame as illustrated comprises two vertical supporting members 1 and 2 joined at their upper ends by a cable tying horizontal member 3, a bottom horizontal member 4, and ten intermediate horizontal members 5, of which only the lowermost and three uppermost are disclosed. The bottom member 4 and intermediate members 5 are connected by two vertical members 6 and 7. Members 1 and 6, and 2 and 7 are joined at suitable intervals by tie bars 8. As illustrated each tie bar 8 is L-shaped thus forming a base and side support to which the vertically placed cables 9 extending to office link frames are suitably tied or secured.

Horizontal members 4 and 5 are also interconnected by ten intermediate vertical members 10 of which only five are illustrated. Secured to the front of each horizontal member 5 is a plurality of cable supports 11, each cable support being substantially C-shaped to enable the ready insertion and removal of cables, wires or jumpers through its open side. Cables 12 incoming from district

link frames have been illustrated as secured to the cable supports 11 of the upper horizontal member 5, cable wires 13 of cables 12 have been illustrated as secured in vertical rows of these supports 11 attached to the left ends of the remaining horizontal members as viewed in Fig. 1 and jumper wires 14 have been illustrated as secured in vertical rows of these supports attached to the right ends of the horizontal members 5 as viewed in Fig. 1.

Similar C-shaped cable supports 15 are secured to the rear side of each horizontal member 5 in which wires 16 of the outgoing cables 9 and jumper wires 14 are supported.

Secured to each of the intermediate vertical members 10 are terminal strips 17 of the type disclosed in cross-section in Fig. 5. Each terminal strip comprises a base 18 of insulating material upon which are superimposed a plurality of grooved separating members 19 also of insulating material, thus forming a strip of substantially T-shape. Secured in the grooves of the separating members 19 are terminal lugs 20, each lug being notched at either end to serve as a soldering terminal for a cable wire or jumper wire. Each terminal strip comprises six rows of terminal lugs with twenty lugs in each row. The base 18 is provided with holes 21 through which the wires to be soldered to each end of each lug may be extended.

The terminal strips 17 are connected to the vertical members 10 in such a manner that their bases extend vertically and their terminal lugs extend horizontally from the front to the rear of the frame as disclosed in Figs. 1 and 2. Thus on a frame completely equipped for distributing trunks from twenty district link frames to trunks extending from twenty office link frames, the terminal strips would appear coordinately arranged on the distributing frame in ten vertical rows of ten strips each.

As indicated in Fig. 5 the terminal lugs of the six vertical rows on the terminal strip serve as soldering terminals for two sets of trunks, the three outer rows for the tip, ring and sleeve conductors of twenty trunks and the three inner rows for the tip, ring and sleeve conductors of twenty other trunks. As illustrated two cables 12 of trunks, each cable having one hundred trunks are incoming from each district link frame and are fanned out over the front of the frame to the tip, ring and sleeve terminal lugs of an appropriate vertical row of terminal strips. Thus, for example the two hundred trunks incoming from the district link frame No. 0 are fanned out to the outer three vertical rows of terminal lugs of the left vertical row of terminal strips as viewed in Fig. 1 and the two hundred trunks incoming from the district link frame No. 1 are fanned out to the inner three vertical rows of terminal lugs of the same vertical row of terminal strips. Similarly, the trunks incoming from district link frames Nos. 2 and 3 are fanned out to the outer three vertical rows and the three inner vertical rows respectively of terminal lugs of the next vertical row of terminal strips.

Two cables 9 of trunks, each cable having one hundred trunks, are outgoing to each office link frame, and are fanned out over the rear of the frame to tip, ring and sleeve terminal lugs of an appropriate horizontal row of terminal strips. Thus, for example, the two hundred trunks outgoing to the office link frame No. 0 are fanned out to the lower twenty sets of terminal lugs on each terminal strip of the lower horizontal row as

viewed in Fig. 2 and the two hundred trunks outgoing to the office link frame No. 1 are fanned out to the upper twenty sets of terminal lugs on each terminal strip of the lower horizontal row. Similarly, the trunks outgoing to office link frames Nos. 2 and 3 are fanned out to the sets of terminal lugs on the next to bottom horizontal row of terminal strips.

The particular manner in which interconnections between incoming and outgoing trunks are established over the frame may be more clearly visualized by referring to Figs. 3 and 4 in which each separate terminal strip has for convenience of illustration been disclosed as two separate strips and in which only one of each set of tip, ring and sleeve terminal lugs has been illustrated. For example, a terminal strip such as is indicated at 17 in Figs. 1 and 2, has been illustrated in two sections at 17-0 and 17-1 in Fig. 3, 17-0 indicating the tip terminal lugs of the outer vertical row of strip 17 and 17-1 indicating the tip terminal lugs of the fourth vertical row of strip 17.

As hereinbefore stated it is a requisite of the cross-bar system that each district link frame have access to every office link frame. Each district link frame is provided with ten secondary district link switches each divided into a right and left section thus being the equivalent of twenty switches, ten of which are positioned on the right side of the frame and ten on the left side of the frame. Similarly each office link frame is provided with ten primary office link switches, each divided into a right and a left section thus being the equivalent of twenty switches, ten of which are positioned on the right side of the frame and ten on the left side of the frame. As each section of a secondary district link switch has access to ten trunks, there are thus two hundred trunks outgoing from each district link frame which, for convenience, are grouped into two cables, one cable containing all trunks to which the ten sections of the district link switches on the right side of the frame have access and the other cable containing all trunks to which the ten sections of district link switches on the left side of the frame have access. Similarly, two hundred trunks extend to each office link frame divided for convenience into two cables, one cable containing all trunks extending to the ten sections of the primary switches on the right side of the office link frame and the other cable containing all trunks extending to the ten sections of the primary switches on the left side of the office link frame.

With the system functioning to its ultimate capacity, twenty district link frames and twenty office link frames would be installed and as the two hundred trunks of each district link frame must be distributed through the distributing frame to the twenty office link frames, this distribution may in accordance with the invention be made on a permanent basis. Until the system is functioning to its ultimate capacity, however, it is not possible to make a permanent distribution of every trunk incoming from a district link frame to appropriate trunks outgoing to office link frames and therefore such trunks are temporarily interconnected by jumper wires.

Under the assumption that only sixteen district link frames and sixteen office link frames are initially installed and since there are two hundred trunks incoming from each district link frame and these trunks are to be distributed to the sixteen office link frames, it would be possible to

distribute  $200 \div 16$  or twelve of these trunks to each office link frame with eight trunks left spare or blanked out, thus giving each district link frame twelve points of access to each office link frame. Should two additional office link frames be installed then the two hundred trunks could be distributed to eighteen office link frames and it would then be possible to distribute  $200 \div 18$  or eleven of these trunks to each office link frame with two trunks left spare or blanked out. Upon the installation of the nineteenth and twentieth office link frames the installation is complete and ten trunks would be distributed to each office link frame.

It is thus obvious from the foregoing that regardless of the size of the initial installation ten of the trunks incoming from any district link frame which are to be distributed to any particular office link frame may be permanently connected since they are required at all times from the initial to the ultimate installation.

Referring now to Figs. 3 and 4 in which the trunk distribution for an initial installation of sixteen district link frames and sixteen office link frames has been diagrammatically illustrated it will be seen that the one hundred trunks of cable 300 incoming from the sections of the secondary switches on the left side of the No. 0 district link frame are connected to the right or front ends of terminal lugs 0L to 9L of section 17-0 of all ten distributing strips in the first vertical row of strips and that the one hundred trunks of cable 301 incoming from the sections of the secondary switches on the right side of the No. 0 district link frame are connected to the right or front ends of terminal lugs 0R to 9R of section 17-0 of all ten distributing strips in the first vertical row of strips. Similarly, the one hundred trunks of cable 302 incoming from the sections of the secondary switches on the left side of the No. 1 district link frame are connected to the right or front ends of terminal lugs 0L to 9L of section 17-1 of all ten distributing strips in the first vertical row of strips and that the one hundred trunks of cable 303 incoming from the sections of the secondary switches on the right side of the No. 1 district link frame are connected to the right or front ends of terminal lugs 0R to 9R of section 17-1 of all ten distributing strips in the first vertical row of strips. In a similar manner the one hundred trunks of cables 304, 305, 306, 307, 308, 309, 310 and 311 from district link frames D2, D3-D14, D15 are connected to the right ends of terminal lugs of other vertical rows of terminal strips. These connections are permanently made since they form a part of the ultimate distribution pattern.

The one hundred trunks of cable 312 outgoing to the sections of the primary switches on the left side of the No. 0 district link frame are connected to the left ends of lugs 0L to 9L appearing in the lower halves of sections 17-0 and 17-1 of all distributing strips of the lowermost horizontal row on the frame while the one hundred trunks of cable 313 outgoing to the sections of the primary switches on the right side of the No. 0 office link frame are connected to the left ends of lugs 0R to 9R appearing in the lower halves of section 17-0 and 17-1 of all distributing strips of the lowermost horizontal row. The one hundred trunks of cable 314 outgoing to the sections of the primary switches on the left side of the No. 1 office link frame are connected to the left ends of lugs 0L to 0L appearing in the upper halves of sections 17-0 and 17-1 of all distributing strips of the



lowest horizontal row and the one hundred trunks of cable 315 outgoing to the sections of the primary switches on the right side of the No. 1 office link frame are connected to the left ends of lugs 0R to 0R appearing in the upper halves of sections 17-0 and 17-1 of all distributing strips of the lowest horizontal row of strips.

In a similar manner the trunks of cables 316, 317, 318, 319-320, 321, 322 and 323 outgoing to office link frames Nos. 2, 3-14, 15 are connected to the left ends of terminal lugs of other horizontal rows of terminal strips. These connections are also permanently made since they form a part of the ultimate distribution pattern.

The ten permanent trunk interconnections from the No. 0 district link frame to the No. 0 office link frame may be traced in part as follows:

From the left section of the No. 0 secondary switch on the district link frame, over cable 300, the 0L terminal lug on section 17-0 of strip 324, over cable 312 to the left section of the No. 0 primary switch on the office link frame;

From the right section of the No. 1 secondary switch on the district link frame, over cable 301, the 1R terminal lug on section 17-0 of strip 324, over cable 313 to the right section of the No. 1 primary switch on the office link frame;

From the left section of the No. 2 secondary switch on the district link frame, over cable 300, the 2L terminal lug on section 17-0 of strip 324, over cable 312 to the left section of the No. 2 primary switch on the office link frame;

From the right section of the No. 3 secondary switch on the district link frame, over cable 301, the 3R terminal lug on section 17-0 of strip 324, over cable 313 to the right section of the No. 3 primary switch on the office link frame;

From the left section of the No. 4 secondary switch on the district link frame, over cable 300, the 4L terminal lug on section 17-0 of strip 324, over cable 312 to the left section of the No. 4 primary switch on the office link frame;

From the right section of the No. 5 secondary switch on the district link frame, over cable 301, the 5R terminal lug on section 17-0 of strip 324, over cable 313 to the right section of the No. 5 primary switch on the office link frame;

From the left section of the No. 6 secondary switch on the district link frame, over cable 300, the 6L terminal lug on section 17-0 of strip 324, over cable 312 to the left section of the No. 6 primary switch on the office link frame;

From the right section of the No. 7 secondary switch on the district link frame, over cable 301, the 7R terminal lug on section 17-0 of strip 324, over cable 313 to the right section of the No. 7 primary switch on the office link frame;

From the left section of the No. 8 secondary switch on the district link frame, over cable 300, the 8L terminal lug on section 17-0 of strip 324, over cable 312 to the left section of the No. 8 primary switch on the office link frame; and

From the right section of the No. 9 secondary switch on the district link frame, over cable 301, the 9R terminal lug on section 17-0 of strip 324, over cable 313 to the right section of the No. 9 primary switch on the office link frame.

The ten terminal trunk interconnections from the No. 0 district link frame to the No. 1 office link frame may be traced in part as follows:

From the right section of the No. 0 secondary switch on the district link frame, over cable 301, the 0R terminal lug on section 17-0 of strip 324, over cable 315 to the right section of the No. 0 primary switch on the office link frame;

From the left section of the No. 1 secondary switch on the district link frame, over cable 300, the 1L terminal lug on section 17-0 of strip 324, over cable 314 to the left section of the No. 1 primary switch on the office link frame;

From the right section of the No. 2 secondary switch on the district link frame, over cable 301, the 2R terminal lug on section 17-0 of strip 324, over cable 315 to the right section of the No. 2 primary switch on the office link frame;

From the left section of the No. 3 secondary switch on the district link frame, over cable 300, the 3L terminal lug on section 17-0 of strip 324, over cable 314 to the left section of the No. 3 primary switch on the office link frame;

From the right section of the No. 4 secondary switch on the district link frame, over cable 301, the 4R terminal lug on section 17-0 of strip 324, over cable 315 to the right section of the No. 4 primary switch on the office link frame;

From the left section of the No. 5 secondary switch on the district link frame, over cable 300, the 5L terminal lug on section 17-0 of strip 324, over cable 314 to the left section of the No. 5 primary switch on the office link frame;

From the right section of the No. 6 secondary switch on the district link frame, over cable 301, the 6R terminal lug on section 17-0 of strip 324, over cable 315 to the right section of the No. 6 primary switch on the office link frame;

From the left section of the No. 7 secondary switch on the district link frame, over cable 300, the 7L terminal lug on section 17-0 of strip 324, over cable 314 to the left section of the No. 7 primary switch on the office link frame;

From the right section of the No. 8 secondary switch on the district link frame, over cable 301, the 8R terminal lug on section 17-0 of strip 324, over cable 315 to the right section of the No. 8 primary switch on the office link frame; and

From the left section of the No. 9 secondary switch on the district link frame, over cable 300, the 9L terminal lug on section 17-0 of strip 324, over cable 314 to the left section of the No. 9 primary switch on the office link frame.

In a similar manner permanent trunk connections may be traced from the No. 0 district link frame to other office link frames and between other district link frames and office link frames, ten such trunks extending from each district link frame to each office link frame.

It will be recalled, however, that in order to utilize as many of the two hundred trunks outgoing from each district link frame prior to the time that the installation is extended to its ultimate capacity, it was possible under the assumption illustrated of sixteen installed district link frames and sixteen installed office link frames, to distribute two additional trunks, on a temporary basis, from each district link frame to each of the sixteen office link frames. These temporary connections are therefore extended by jumper wires connected from the rear side of certain terminal strips to which no permanent office cable trunks have yet been connected, to the front side of certain terminal strips to which no permanent district cable trunks have yet been connected. Such jumper connections have been designated at 14 in Figs. 1 and 2.

Referring again to Figs. 3 and 4, until the seventeenth, eighteenth, nineteenth and twentieth or Nos. 16, 17, 18, and 19 office link frames are installed there will be no trunks extending to office link frames connected to the left ends of the terminal lugs of strips 325, 326-327 and of



strips, 328, 329—330 and similarly until corresponding district link frames are installed there will be no trunks incoming from district link frames connected to the right ends of the terminal lugs of strips 331, 332—333 and of strips 334, 335—336. These terminal lugs may therefore be employed for the connection of jumper wires to distribute the extra two trunks from each of the sixteen installed district link frames to each of the sixteen installed office link frames.

For example, the first of the two additional trunk connections from the No. 0 district link frame to the No. 0 office link frame may be traced in part from the right section of the No. 0 secondary switch on the No. 0 district link frame over cable 301, the OR terminal lug of the 17—0 section of strip 328, thence by a jumper in group 337, the OR terminal lug of the 17—1 section of strip 334, over cable 313 to the right section of the No. 0 primary switch in the No. 0 office link frame, and the second of the two connections may be traced from the left section of the No. 3 secondary switch on the No. 0 district link frame over cable 300, the 3L terminal lug on the 17—0 section of strip 328, thence by a jumper in group 338 to the 3L terminal lug of the 17—1 section of strip 334, over cable 312 to the left section of the No. 3 primary switch on the No. 0 office link frame. In a similar manner additional trunks are connected from the No. 0 district link frame over cables 300 and 301, section 17—0 of strip 328, jumper groups 337 and 338, sections 17—1 of strips 334, 335 and other strips (not shown) in the same vertical row to office link frames Nos. 1 to 9, inclusive.

The first of the two additional trunks connections from the No. 1 district link frame to the No. 0 district link frame may be traced in part from the left section of the No. 0 secondary switch on the No. 1 district link frame over cable 302, the OL terminal lug of the 17—1 section of strip 328, thence by jumper in group 339, the OL terminal lug of the 17—0 section of strip 334, over cable 312 to the left section of the No. 0 primary switch on the No. 0 office link frame, and the second of the two connections may be traced from the right section of the No. 3 secondary switch on the No. 1 district link frame over cable 303, the 3R terminal lug on section 17—1 of strip 328, a jumper in group 340, the 3R terminal lug on the 17—0 section of strip 334, over cable 313, to the right section of the No. 3 primary switch on the No. 0 office link frame. In a similar manner, additional trunks are connected from the No. 1 district link frame over cables 302 and 303, section 17—1 of strip 328, jumper groups 339 and 340, sections 17—0 of strips 334, 335 and other strips (not shown) in the same vertical row to office link frames Nos. 1 to 9, inclusive.

The first of the two additional trunk connections from the No. 2 district link frame to the No. 0 district link frame may be traced in part from the right section of the No. 2 secondary switch on the No. 2 district link frame over cable 305, the 2R terminal lug of section 17—0 of strip 329, then by a jumper in group 341, the 2R terminal lug of section 17—1 of strip 334, over cable 313 to the right section of the No. 2 primary switch on the No. 0 office link frame, and the second of the two connections may be traced from the left section of the No. 5 secondary switch on the No. 2 district link frame over cable 304, the 5L terminal lug of section 17—0 of strip 329, thence by jumper in group 342 to the 5L

terminal lug of section 17—1 of strip 334, over cable 312 to the left section of the No. 5 primary switch on the No. 0 office link frame. In a similar manner additional trunks are connected from the No. 2 district link frame over cables 304 and 305, section 17—0 of strip 329, jumper groups 341 and 342, sections 17—1 of strips 334, 335 and other strips (not shown) in the same vertical row to office link frames Nos. 1 to 9, inclusive, and from the No. 3 district link frame over cables 306 and 307, section 17—1 of strip 329, jumper groups 343 and 344, sections 17—0 of strips 334, 335, and other strips (not shown) in the same vertical row, to office link frames Nos. 0 to 9, inclusive. Also jumper connections, not shown, would be run in a similar manner from terminal strips of the upper horizontal row, not shown, to which trunks incoming from district link frames Nos. 4 to 9, inclusive are connected, to terminal strips 334, 335 and other strips of the same vertical row to which trunks outgoing to office link frames Nos. 0 to 9, inclusive, are connected.

The two additional trunks from each district link frame Nos. 10 to 16, inclusive, to each office link frame Nos. 0 to 9, inclusive, are established over jumpers extending from terminal strips in the upper horizontal row to strips 331, 332 and other strips, not shown, in the same vertical row. For example, the first of the two additional trunk connections from the No. 14 district link frame to the No. 0 office link frame may be traced in part from the right section of the No. 4 secondary switch on the No. 14 district link frame over cable 309, the 4R terminal lug on section 17—0 of strip 330, a jumper in group 345, the 4R terminal lug on section 17—1 of strip 331, over cable 313 to the right section of the No. 4 primary switch on the No. 0 office link frame and the second of the two connections may be traced from the left section of the No. 7 secondary switch of the No. 14 district link frame over cable 308, the 7L terminal lug on section 17—0 of switch 330, a jumper in group 346, the 7L terminal lug of section 17—1 of strip 331, over cable 312 to the left section of the No. 7 primary switch on the No. 0 office link frame. Similarly, the first of the two additional trunks from the No. 15 district link frame to the No. 3 office link frame may be traced in part from the right section of the No. 6 secondary switch of the No. 15 district link frame over cable 311, the 6R terminal lug of section 17—1 of strip 330, a jumper in group 347, the 6R terminal lug of section 17—0 of strip 332, over cable 319 to the right section of the No. 6 primary switch of the No. 3 office link frame and the second of the two connections may be traced from the left section of the No. 9 secondary switch of the No. 15 district link frame over cable 310, the 9L terminal lug of section 17—1 of strip 330, a jumper in group 348, the 9L terminal lug of section 17—0 of strip 332, over cable 318, to the left section of the No. 9 primary switch of the No. 3 office link frames.

When the seventeenth and eighteenth, or Nos. 16 and 17, district link frames and the seventeenth and eighteenth or Nos. 16 and 17 office link frames are installed, one additional terminal strip would be added adjacent to strip 330 in the upper horizontal row and two additional strips would be added adjacent to strip 327 in the next to uppermost horizontal row. Since as previously stated, it is now possible to run but eleven trunks from each district link frame to each office link frame one set of the additional jumper connections

tions may be disconnected, for example, the jumper connections run in groups 338, 340, 342 and 344 and other similar groups extending from the left five strips in the upper horizontal row of strips to the lower five strips in the right vertical row including strips 334 and 335. Since it is now necessary to utilize the terminal strips in the vertical row including strips 331 and 332 for permanent district cable connections to the Nos. 16 and 17 district link frames, it is now necessary to disconnect all jumper groups, such as 345, 346, 347 and 348 extending from the remaining strips in the upper horizontal row including strip 330, to the lower five strips in the vertical row including strips 331 and 332 and to run new jumpers.

For example, the new temporary trunk connections from district link frame No. 14 to office link frames Nos. 0 to 3 will be run as follows:

20 From the left section of the No. 5 secondary switch on the No. 14 district link frame over cable 308, the 5L terminal lug on section 17-0 of strip 330, a jumper in the new jumper group 349 indicated by the dotted line, the 5L terminal lug on section 17-1 of strip 334, over cable 312 to the left section of the No. 5 primary switch on the No. 0 office link frame;

30 From the right section of the No. 5 secondary switch on the No. 14 district link frame over cable 309, the 5R terminal lug on section 17-0 of strip 330, a jumper in group 349, the 5R terminal lug in section 17-1 of strip 334, over cable 315 to the right section of the No. 5 primary switch on the No. 1 office link frame;

35 From the left section of the No. 7 secondary switch of the No. 14 district link frame over cable 308, the 7L terminal lug on section 17-0 of strip 330, a jumper in group 349, the 7L terminal lug in section 17-1 of strip 335, over cable 316 to the left section of the No. 7 primary switch on the No. 2 office link frame; and

40 From the right section of the No. 7 secondary switch on the No. 14 district link frame over cable 309, the 7R terminal lug on section 17-0 of strip 330, a jumper in group 349, the 7R terminal lug in section 17-1 of strip 335, over cable 319 to the right section of the No. 7 primary switch on the No. 3 office link frame.

The new temporary trunk connections from district link frame No. 15 to office frames Nos. 0 to 3 will extend as follows:

50 From the right section of the No. 5 secondary switch on the No. 15 district link frame over cable 311, the 5R terminal lug on section 17-1 of strip 330, a jumper in the new jumper group 350, the 5R terminal lug in section 17-0 of strip 334, over cable 313 to the right section of the No. 5 primary switch on the No. 0 office link frame;

60 From the left section of the No. 5 secondary switch on the No. 15 district link frame over cable 310, the 5L terminal lug on section 17-1 of strip 330, a jumper in group 350, the 5L terminal lug in section 17-0 of strip 334, over cable 314 to the left section of the No. 5 primary switch on the No. 1 office link frame;

70 From the right section of the No. 7 secondary switch on the No. 15 district link frame over cable 311, the 7R terminal lug on section 17-1 of strip 330, a jumper in group 350, the 7R terminal lug in section 17-0 of strip 335, over cable 317 to the right section of the No. 7 primary switch on the No. 2 office link frame, and

75 From the left section of the No. 7 secondary switch on the No. 15 district link frame over

cable 310, the 7L terminal lug on section 17-1 of strip 330, a jumper in group 350, the 7L terminal lug in section 17-0 of strip 335 over cable 318 to the left section of the No. 7 primary switch on the No. 4 office link frame.

When the nineteenth and twentieth or Nos. 18 and 19 district link frames and the nineteenth and twentieth or Nos. 18 and 19 office link frames are installed, these new jumper connections are disconnected since then all trunks are connected 10 through the frame on a permanent basis.

Having discussed the manner in which temporary trunk connections between district link frames Nos. 0 to 15 and office link frames Nos. 0 to 9 are extended by jumpers on a temporary basis until the initial installation of sixteen district link frames has been extended to the ultimate of twenty frames, the extension of temporary trunk connections from district link frames Nos. 0 to 15 to office link frames Nos. 10 to 15 will be considered.

The two additional trunk connections from district link frame No. 0 to office link frame No. 14 are temporarily established as follows:

25 From the right section of the No. 4 secondary switch on the No. 0 district link frame over cable 301, the 4R terminal lug on section 17-0 of strip 325, a jumper in group 351, the 4R terminal lug on section 17-1 of strip 336, over cable 321 to the right section of the No. 4 primary switch on the No. 14 office link frame; and from the left section of the No. 7 secondary switch on the No. 0 district link frame over cable 300, the 7L terminal lug on section 17-0 of strip 325, a jumper in group 352, the 7L terminal lug in section 17-1 of strip 336, over cable 320 to the left section of the No. 7 primary switch on the No. 14 office link frame.

The two additional trunk connections from district link frame No. 0 to the office link frame No. 15 are established as follows:

45 From the left section of the No. 4 secondary switch on the No. 0 district link frame over cable 300, the 4L terminal lug on section 17-0 of strip 325, a jumper in group 351, the 4L terminal lug on section 17-1 of strip 336, over cable 322, to the left section of the No. 4 primary switch on the No. 15 office link frame; and

55 From the right section of the No. 7 secondary switch on the No. 0 district link frame over cable 301, the 7R terminal lug on section 17-0 of strip 325, a jumper in group 352, the 7R terminal lug on section 17-1 of strip 336, over cable 323, to the right section of the No. 7 primary switch on the No. 15 office link frame.

In a similar manner additional trunks from the No. 0 district link frame to office link frames Nos. 10 to 13, inclusive, are extended by jumpers in jumper groups 351 and 352 as indicated.

60 Additional trunk connections from district link frame No. 1 to office link frames Nos. 10 to 15, inclusive, are extended by jumpers in groups 353 and 354 connected between section 17-1 of terminal strip 325 and sections 17-0 of strips in the vertical row with strip 336 to which cables 65 to the Nos. 10 to 15 office link frames have been connected. The additional trunk connections from district link frame No. 2 to office link frames Nos. 10 to 15, inclusive, are extended by jumpers in groups 355 and 356 connected between section 17-0 of terminal strip 326 and sections 17-1 of strips in the vertical row with strip 336, to which cables to the Nos. 10 to 15 office link frames have been connected. The additional trunk connections from district link 75

frame No. 3 to office link frames Nos. 10 to 15, inclusive, are extended by jumpers in groups 357 and 358 connected between section 17-1 of terminal strip 325 and sections 17-0 of strips in the vertical row with strip 336 and to which trunks to the Nos. 10 to 15 office link frames have been connected. The additional trunk connections from district link frames No. 5 to 9 extend in a similar manner by jumpers from terminal strips, not shown, in the horizontal row with strips 325 and 326 to terminal strips in the vertical row with strip 336, to which cables to the Nos. 10 to 15 office link frames are connected.

The additional trunk connections from district link frames Nos. 10 to 15, inclusive, extend from the remaining terminal strips in the same horizontal row with strip 327 to which cables from these district link frames are connected, by jumpers to the terminal strips in the same vertical row with strip 333 and to which cables to office link frames Nos. 10 to 15 have been connected. For example, the additional trunk connections from the No. 14 district link frame are extended over jumpers in groups 359 and 360 from the 17-0 section of strip 327 to the 17-1 sections of strips in the vertical row including strip 333, and the additional trunk connections from the No. 15 district link frame are extended over jumpers in groups 361 and 366 from the 17-1 section of strip 327 to the 17-0 sections of strips in the vertical row including strip 333.

When the installation is extended by the addition of more than sixteen district links and office link frames, additional terminal strips are installed in the upper right portion of the distributing frame as disclosed in Fig. 4 as previously described and all jumpers connected to the horizontal row of strips, including strips 325, 326-327, must be disconnected and new jumpers run since the addition of the Nos. 16 and 17 office link frames necessitates the running of permanent cables from such frames to the left ends of the terminal lugs of these strips. Now, however, only one additional trunk from each of the eighteen installed district link frames to every installed office link frame may be extended. For example, the additional trunk conductors from the No. 0 district link frame to the Nos. 10 to 18 office link frames are extended from section 17-0 of terminal strip 328 by jumpers in group 362 to sections 17-1 of the terminal strips in the vertical row with strip 336 to which cables to the Nos. 10 to 18 office link frames are connected; the additional trunk conductors from No. 1 district link frame to the Nos. 10 to 18 office link frames are extended from section 17-1 of strip 328 by jumpers in group 363 to sections 17-0 of the strips in the vertical row with strip 336 to which cables to the Nos. 10 to 18 office link frames are connected; the additional trunk conductors from the No. 2 district link frame to the Nos. 10 to 18 office link frames are extended from section 17-0 of strip 329 by jumpers in group 364 to section 17-1 of the strips in the vertical row with strip 336 to which cables to the Nos. 10 to 18 office link frames are connected; and the additional trunk conductors from the No. 3 district link frame to the Nos. 10 to 18 office link frames are extended from section 17-1 of strip 329 by jumpers in group 365 to sections 17-0 of strip 336 to which cables to the Nos. 10 to 18 office link frames are connected.

The additional trunk connections from the Nos. 10 to 18 district link frames to the Nos. 10 to 18 office link frames are extended from the

distributing strips in the upper horizontal row to which the cables of these district link frames are incoming, over jumpers in groups 349 and 350 to the strips in the vertical row containing strip 336 to which cables extending to the Nos. 10 to 18 office link frames are connected, such jumper connections being indicated between terminal strips 330 and 336.

When the traffic requires the installation of the nineteenth and twentieth or Nos. 18 and 19 district link and office link frames, all jumper wires are removed and permanent trunk connections are established over the distributing strips in the manner previously described in connection with the establishment of ten permanent trunk connections from the No. 0 district link frame to the No. 0 office link frame.

It is thus possible during the growth of the installation to distribute trunks over the distributing frame on a permanent and temporary basis, the temporary connections being installed in such a pattern that a minimum of alteration of the trunking connections is necessitated, such alteration being made possible quickly and with small disruption of the traffic through the office.

A distributing rack of substantially the same character is also applicable for the distribution of trunks between secondary switches of incoming link frames and the primary switches of line link frames.

What is claimed is:

1. In a trunk distribution system a distributing frame, a pair of vertical supports, a plurality of horizontal members extending between said supports, a plurality of C-shaped wire supporting brackets attached to the front and rear of said members, the brackets on the front of said members being aligned in vertical rows to support wires extending vertically on said frame and the brackets on the rear of each of said members being aligned to support wires extending horizontally on said frame, a plurality of vertical members attached to said horizontal members and a plurality of terminal strips secured to each of said vertical members.

2. In a trunk distribution system a distributing frame, a pair of vertical supports, a plurality of horizontal members extending between said supports, a plurality of C-shaped wire supporting brackets attached to the front and rear of said members, the brackets on the front of said members being aligned in vertical rows to support wires extending vertically on said frame and the brackets on the rear of each of said members being aligned to support wires extending horizontally on said frame, a plurality of vertical members attached to said horizontal members and a plurality of terminal strips secured to each of said vertical members with the connection terminals of each strip extending horizontally from the front to the rear of said frame.

3. In a trunk distribution system, a distributing frame, a pair of vertical supports, a plurality of horizontal members extending between said supports, a plurality of vertical members attached to said horizontal members and a plurality of terminal strips secured to each of said vertical members, each of said terminal strips having a plurality of vertical rows of connection terminals and each connection terminal extending horizontally from the front to the rear of said frame whereby wires may be attached thereto from both the front and rear sides of said frame.

4. In a trunk distribution system, a distribut-

ing frame, a pair of vertical supports, a plurality of horizontal members extending between said supports, a plurality of vertical members attached to said horizontal members and a plurality of terminal strips secured to each of said vertical members, each of said terminal strips having a plurality of vertical rows of sets of connection terminals, and each set of connection terminals comprising a tip, ring and sleeve terminal extending horizontally from the front to the rear of said frame whereby the tip, ring and sleeve conductors of incoming trunks may be connected thereto from the front of the frame and the tip, ring and sleeve conductors of outgoing trunks may be connected thereto from the rear of said frame.

5. In a trunk distribution system, a distributing frame, a pair of vertical supports, a plurality of horizontal members extending between said supports, a plurality of vertical members attached to said horizontal members and a plurality of terminal strips secured to each of said vertical members in such a manner that said terminal strips are coordinately positioned in vertical and horizontal rows, each of said terminal strips having a plurality of sets of connection terminals coordinately arranged in vertical and horizontal rows, the vertical rows of terminal sets on all terminal strips of each vertical row of strips being in alignment and the horizontal rows of terminal sets on all terminal strips in each horizontal row of strips being in alignment.

6. In a trunk distribution system, a distributing frame, a plurality of terminal strips secured thereto in such a manner that said strips are coordinately positioned in vertical and horizontal rows, each of said strips having a plurality of sets of connection terminals arranged in vertical rows, cables of incoming trunks associated with each vertical row of terminal strips, the trunks thereof being fanned into connection with the terminal sets of the vertical rows of connection terminals of said strips, and cables of outgoing trunks associated with each of said horizontal rows of terminal strips, the trunks thereof being fanned into connection with the terminal sets of said row of strips.

7. In a trunk distribution system, a distributing frame, a plurality of terminal strips secured thereto in such a manner that said strips are coordinately positioned in vertical and horizontal rows, each of said strips having a plurality of sets of connection terminals arranged in vertical and horizontal rows, and each terminal extending horizontally from the front to the rear of said frame, a plurality of cables of incoming trunks associated with each vertical row of terminal strips, the trunks thereof being fanned into connection with the front ends of the terminals of the vertical rows of terminal sets of said strips, and a plurality of cables of outgoing trunks associated with each of said horizontal rows of terminal strips, the trunks thereof being fanned into connection with the rear ends of the terminals of the horizontal rows of terminal sets of said strips.

8. In a trunk distribution system, a distributing frame, a plurality of terminal strips secured

thereto in such a manner that said strips are coordinately positioned in vertical and horizontal rows, each of said strips having a plurality of sets of connection terminals arranged in two vertical and twenty horizontal rows, and each terminal extending horizontally from the front to the rear of said frame, a plurality of cables of incoming trunks associated with each vertical row of terminal strips, the trunks of certain of said cables being fanned into connection with the front ends of the terminals of one of the vertical rows of terminal sets of said strips and the trunks of others of said cables being fanned into connection with the front ends of the terminals of the other of the vertical rows of terminal sets of said strips, and a plurality of cables of outgoing trunks associated with each horizontal row of terminal strips, the trunks of certain of said cables being fanned into connection with the rear ends of the terminals of the lower ten horizontal rows of terminal sets of said strips and the trunks of others of said cables being fanned into connection with the rear ends of the terminals of the upper ten horizontal rows of terminal sets of said strips.

9. In a trunk distribution system, a distributing frame, a plurality of terminal strips secured thereto in such a manner that said strips are coordinately positioned in vertical and horizontal rows, each of said strips having a plurality of sets of connection terminals arranged in vertical and horizontal rows, cables of incoming trunks associated with each of certain of said vertical rows of terminal strips, the trunks thereof being fanned into connection with the terminal sets of the vertical rows of connection terminals of said strips, cables of outgoing trunks associated with each of certain of said horizontal rows of terminal strips, the trunks thereof being fanned into connection with the terminal sets of horizontal rows of connection terminals of said strips, and jumper wires connecting terminal sets to which no outgoing trunks are connected with terminal sets to which no incoming trunks are connected.

10. In a trunk distribution system, a distributing frame, a plurality of terminal strips secured thereto in such a manner that said strips are coordinately positioned in vertical and horizontal rows, each of said strips having a plurality of sets of connection terminals arranged in vertical and horizontal rows, and each terminal extending horizontally from the front to the rear of said frame, cables of incoming trunks associated with each of certain of said vertical rows of terminal strips, the trunks thereof being fanned into connection with the front ends of the terminals of the vertical rows of terminal sets of said strips, a plurality of cables of outgoing trunks associated with each of certain of said horizontal rows of terminal strips, the trunks thereof being fanned into connection with the rear ends of the terminals of the horizontal rows of terminal sets of said strips, and jumper wires connecting the rear ends of terminals of terminal sets to which no outgoing trunks are connected with the front ends of terminals of terminal sets to which no incoming trunks are connected.

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